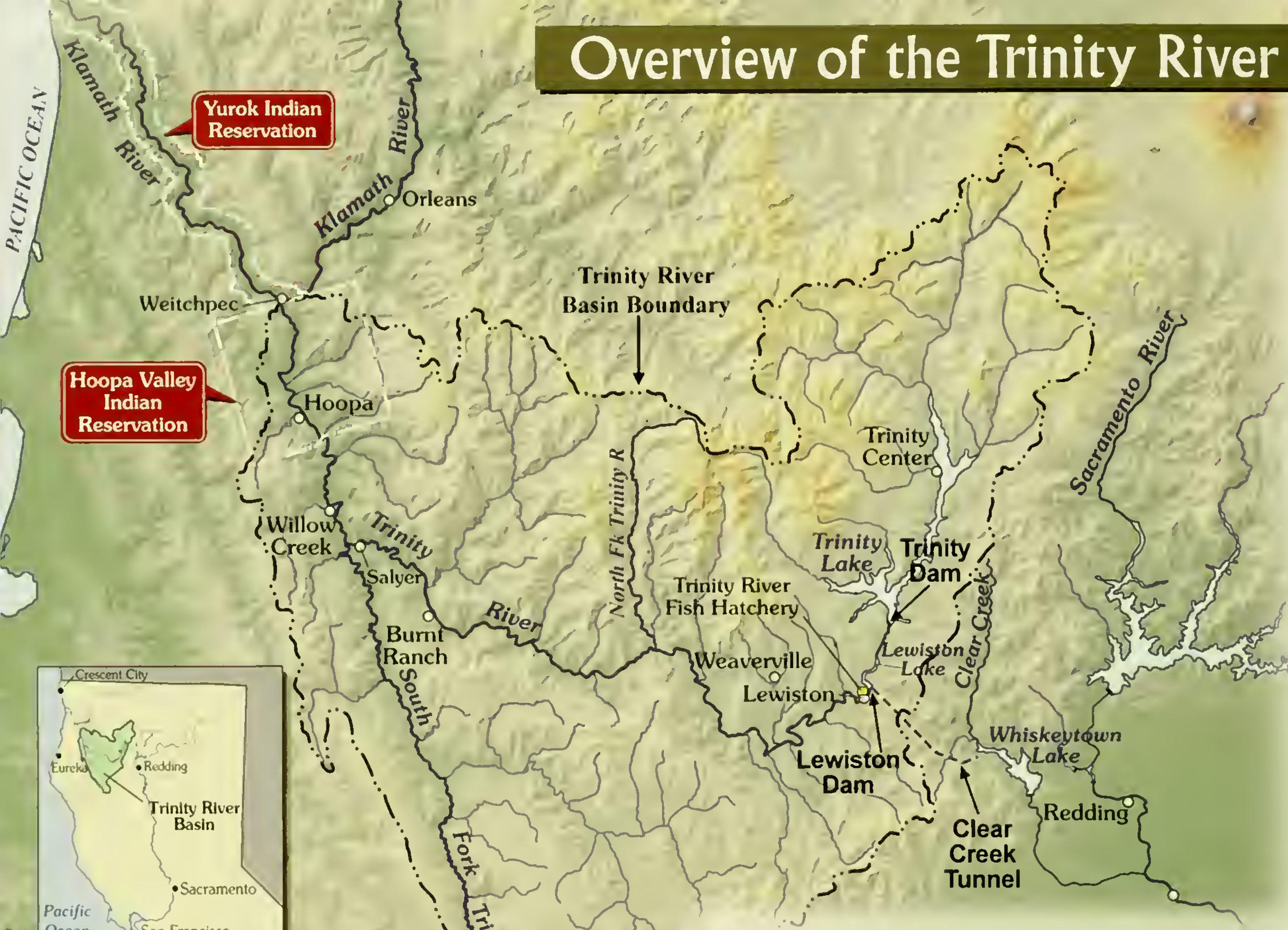
TRINITY RIVER RESTORATION PROGRAM

SUMMARY OF
THE UNITED STATES SECRETARY OF THE INTERIOR
RECORD OF DECISION, DECEMBER 19, 2000

Overview of the Trinity River



The Trinity River

The Trinity River begins in the rugged Trinity Alps in northwestern California. On its journey, it tumbles through steep canyons and meanders through broad valleys until it joins with the Klamath River to flow into the Pacific Ocean.

This powerful river once supported large populations of fall- and spring-run chinook salmon, as well as smaller runs of coho salmon and steelhead. Floods, as predictable as the salmon, refreshed spawning gravels, scoured deep holes and provided clear, cool water.

For thousands of years, the Hoopa and Yurok tribes used the fish, plants and animals in and along the Trinity River for subsistence, cultural, ceremonial and commercial purposes.

Pre-dam Trinity River upstream of Lewiston.

Hoopa fisherman, early 1900s

1900

Trinity River Native Anadromous Salmonids

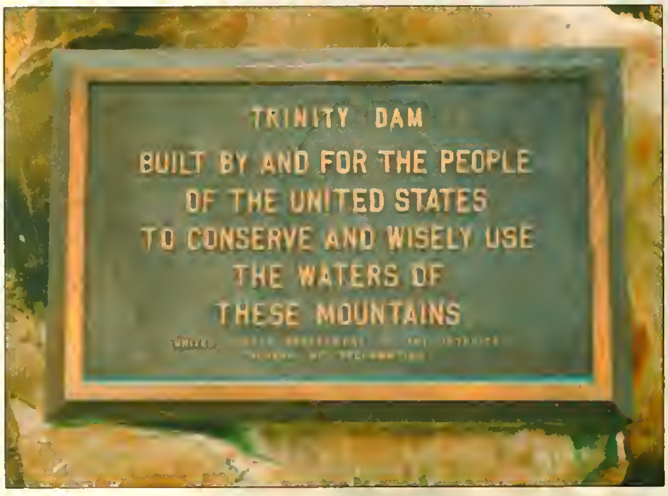
- Chinook ("King") Salmon
- Coho ("Silver") Salmon
- Steelhead

Historical Impacts

"GOLD!" discovery in the late 1840s marked the start of drastic changes in the Trinity River and its watershed. Small-scale placer mining, like panning and sluicing, was mostly replaced by more efficient hydraulic and dredger mining by the early 1900s and continued through the 1950s.

From the beginning, miners, homesteaders and others making their living in Trinity County logged the hillsides and valleys for lumber and firewood. In the 1950s, industrial logging began in earnest. In sensitive areas of the watershed, such as Grass Valley Creek, highly erodible granitic soils were left unprotected and large volumes of sand washed into the Trinity River.

Even with all of these disturbances, the Trinity River had adequate flows and habitat, and salmon and steelhead continued to return in large numbers. In 1958, a plan was executed to increase water supplies in California's Central Valley in part by transferring water from the Trinity River into the Sacramento River. Completed in 1964, the Trinity River Division of the Central Valley Project (TRD) began a decades-long era wherein up to 90% of the river's flow was exported from the river each year.



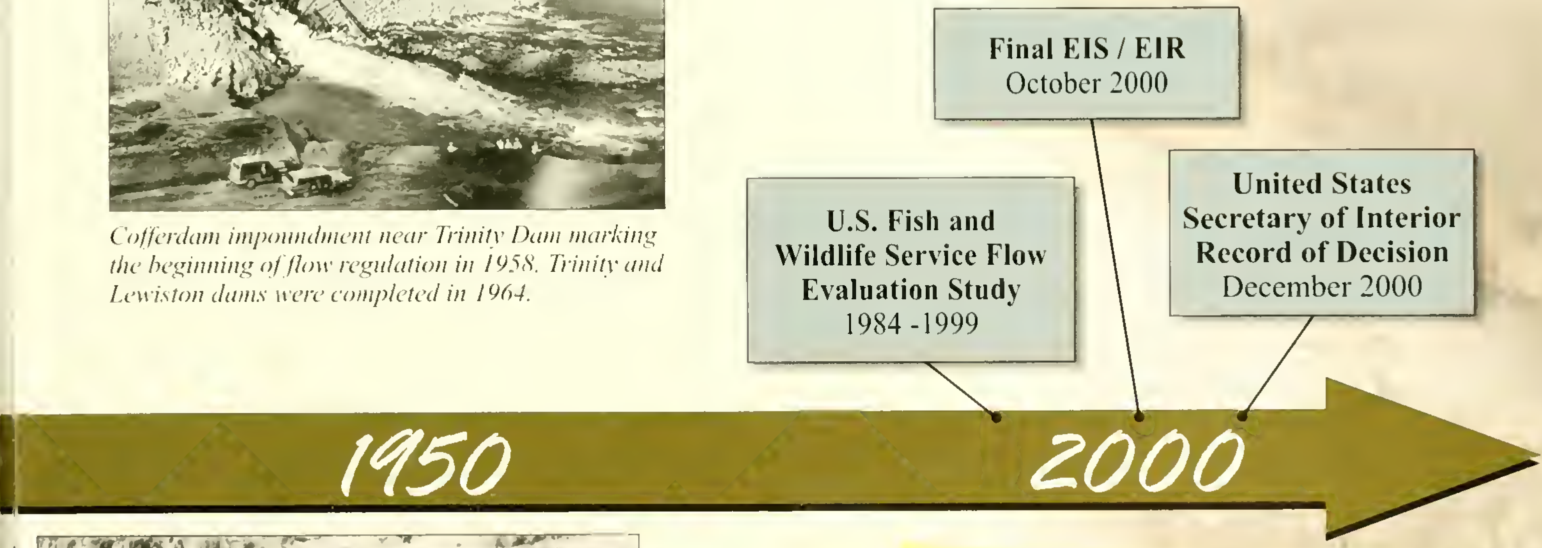
Dedication plaque at Trinity Dam

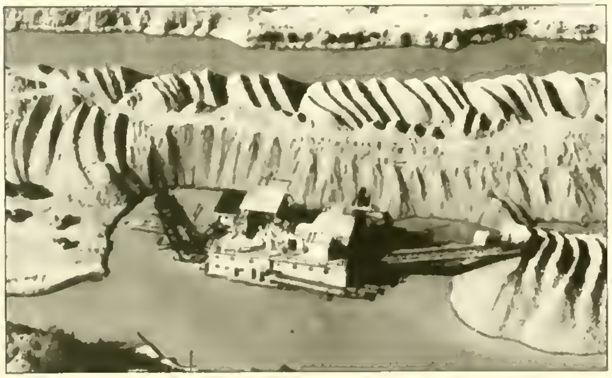
Cofferdam impoundment near Trinity Dam marking the beginning of flow regulation in 1958. Trinity and Lewiston dams were completed in 1964.

Restoring Salmon and Steelhead Populations

The impacts of land use and dams combined to push the river past its regenerative capacity. By 1970, less than 10 years after the dams were completed, the extent of habitat alteration and decline in salmon and steelhead populations became obvious.

Intent on reversing the decline, the U.S. Fish and Wildlife Service, Hoopa Valley Tribe and other agencies began studies that culminated in the *Trinity River Flow Evaluation Study*. Completed in June 1999, this study is the foundation of the Trinity River Restoration Program which is designed to restore the Trinity River and its populations of salmon, steelhead and other fish and wildlife.





Gold dredger near Lewiston, 1950 (TCHS photo)

What is the purpose of the Trinity River Restoration Program?

The purpose of the program is to restore and maintain the natural production of salmon and steelhead on the Trinity River mainstem downstream of Lewiston Dam.

Impacts of Trinity River Division (TRD)

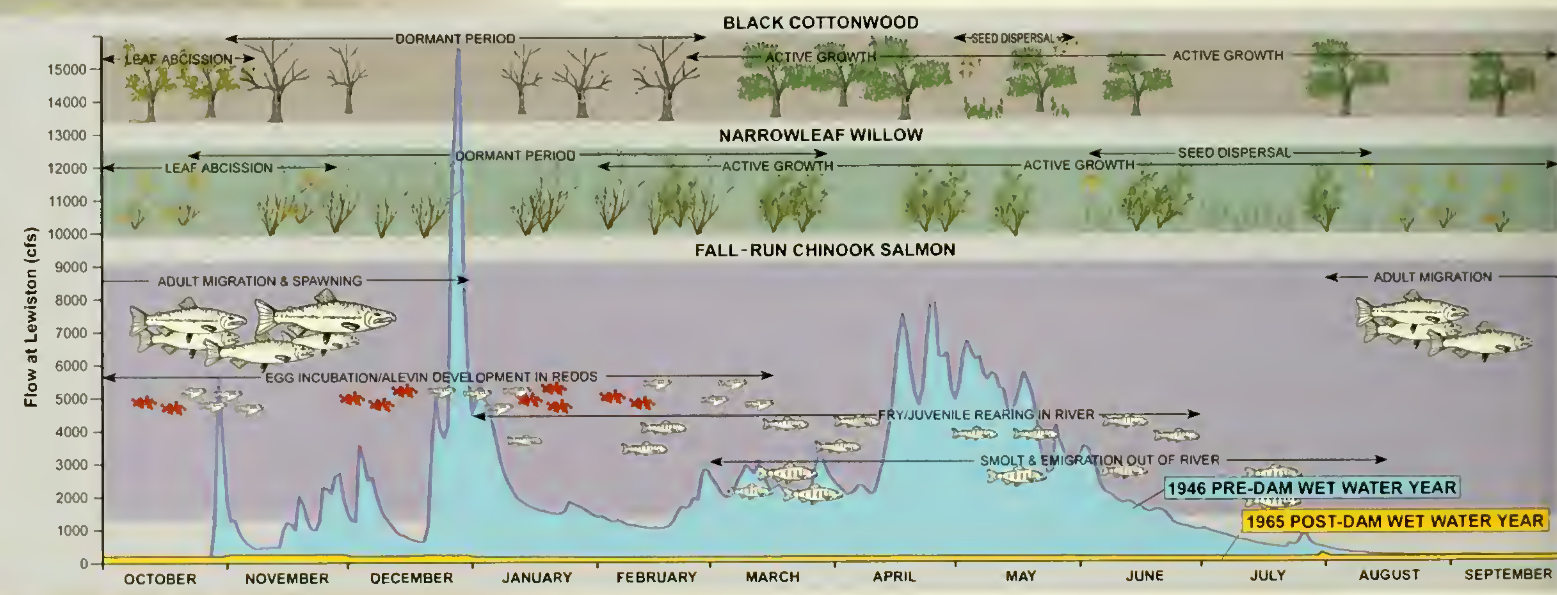
The Natural System

The Trinity River's native plants and animals are adapted to natural river flow patterns and habitat conditions. In the figure below, the annual life cycles of fall-run chinook salmon and two riparian plants, black cottonwood and narrowleaf willow, are overlaid on an example natural hydrograph (a hydrograph shows the average flow for each day for every day of the year).

Salmon adaptation to the river's hydrology is evident -- late fall and early winter rainstorms (the peaks in October through December) help draw adult salmon up into the river; winter baseflows allow for spawning; and the spring snowmelt (April through June) assists juveniles in their journey to the ocean before the warm, low flows of summer.

The plants that live along the river are similarly adapted -- winter rainstorms and spring snowmelt floods scour away dormant seedlings and saplings growing too close to the river's edge; seeds released in the spring and early summer sprout higher up on the bank when the water level is high; and seedlings on these higher surfaces are able to grow during the slowly receding spring snowmelt, which has recharged the groundwater table.

Understanding these adaptations help us evaluate the impact of river management and focus our restoration actions on critical factors. The linkages between natural processes and biota are integrated in the Trinity River Restoration Program recommendations.

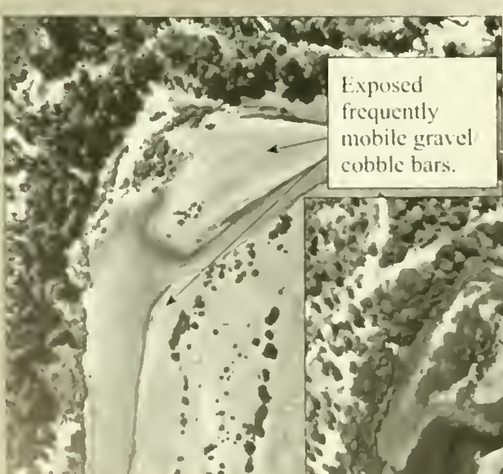


TRD Impacts on the Trinity River Channel

A river's size and shape ("morphology") is determined by the interaction of its flows and sediment ("fluvial processes"). Prior to the TRD, streamflows varied greatly between and within each year. In a given year, flows could be as low as 100 cubic feet per second (cfs) during the summer up to over 100,000 cfs during rare rain-on-snow floods. After the TRD was complete, flows were held between 150 cfs and 300 cfs year-round except for occasional storm-response reservoir releases, the largest of which was 14,500 cfs in 1974.

The natural flow variability and sediment supply created a complex and dynamic channel which was beneficial to salmon and steelhead. However, when the TRD was completed, up to 90% of the average annual water yield of the Trinity River was diverted to the Sacramento River basin, and all sediment (cobble, gravel and sand) that had previously been supplied from the upper watershed was blocked from continuing down the river. The loss of sediment availability and flow magnitude and variability caused changes in the river channel downstream of Lewiston Dam.

The most dramatic and obvious change was with riparian vegetation (the plants that live near the river). Under natural conditions, high winter and spring flows kept willows and alders from growing too close to the summer low flow channel (see photo far left). In the absence of high flows, these plants were able to sprout and become established in a thin band along the river's edge (see photo near left). This dense vegetation traps sand, causing confining "riparian berms" to form. The berms, reaching up to 12 feet in height, act as levees to separate the river from its historic gravel/cobble bars and floodplains.



Gold Bar pre-TRD, 1961

Six years after TRD completion, encroachment of riparian vegetation on the low water edge was already severe at Gold Bar (six miles downstream of Lewiston Dam, photo 1970)

What is the TRD?

The Trinity River Division (TRD) of the Central Valley Project is composed of Trinity Dam (a large storage reservoir), Lewiston Dam (which controls the water released into Trinity River) and Clear Creek Tunnel (which transports water from Lewiston Dam into Whiskeytown Lake in the Sacramento River Basin).

TRD Impacts to Salmon and Steelhead

The changes to the Trinity River altered the quantity and quality of habitat for salmon and steelhead. The habitat above the dams was entirely lost, and the remaining in-river habitat was severely degraded, especially from Lewiston Dam downstream to North Fork Trinity River. Salmon and steelhead in the Trinity River depended on its dynamic and alluvial nature (mobile and free to form its bed and banks) for high quality habitat. Natural fluvial processes, driven by high flows and adequate coarse sediment supply, created and maintained complex channel morphology which provided suitable conditions for adults, eggs, alevin, fry, juveniles and smolts.

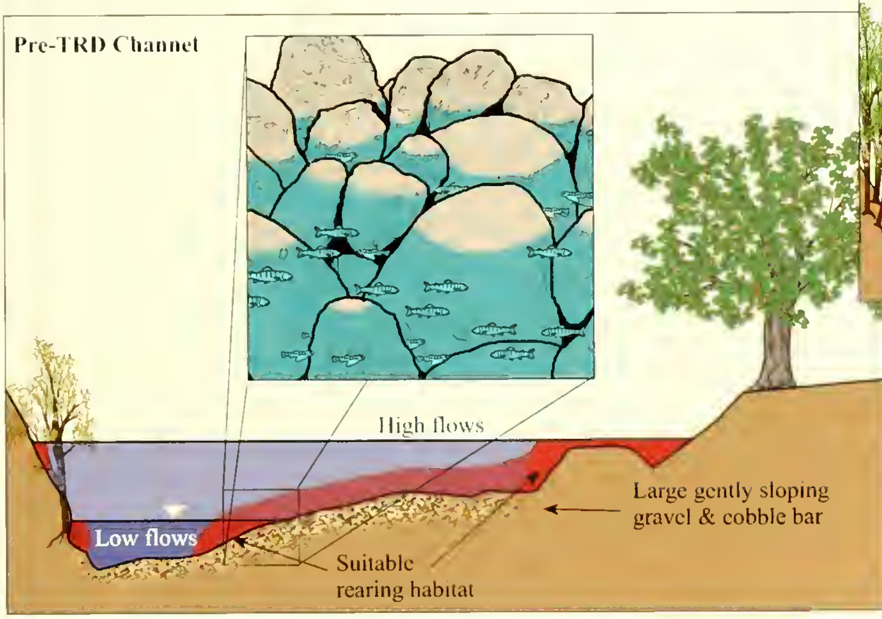
After the dams, once deep pools used by adults filled with sand; during summer, water temperatures reached lethal levels for juvenile and smolts; gently sloping banks necessary for fry and juveniles were eliminated by riparian berms; and much of the spawning gravel was scoured away, and that remaining was choked with sand. Our increasing scientific understanding of the importance of natural river form and process to salmon and steelhead populations reinforces a recovery strategy that restores those natural conditions.

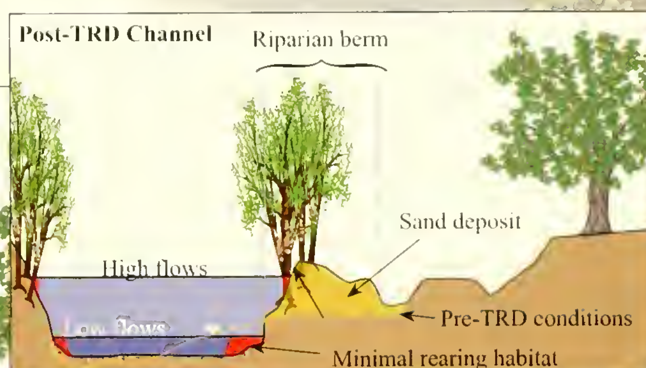
oho salmon, a threatened species on the mainstem Trinity iver, migrating upstream to its spawning grounds.

Summary of Impacts

- Over 100 miles of cold water salmon and steelhead spawning and juvenile rearing habitat upstream of dams has been lost, forcing the lower river to take on the role of spawning and cold water juvenile rearing habitat
- The high flow regime responsible for creating and maintaining channel morphology and high quality habitat has been severely reduced
- Coarse sediment (gravel and cobbles) from the upper watershed is trapped behind the dams
- Coarse sediment deposited by tributaries below the dams locally accumulates at deltas because river flows are too low to transport the coarse sediment downstream
- The historic dynamic channel is "shackled" by the riparian berms; once mobile gravel/cobble bars are trapped under and behind the berms, and in-channel gravel/cobble deposits are not being replenished
- The river channel has been simplified to a straight, rectangular channel with steep banks, reducing habitat quantity and quality, particularly for rearing salmon and steelhead fry
- Fine sediment (sand) has accumulated in spawning gravels and has filled pools used as "holding" habitat for adult chinook salmon
- Flow releases are often too low to provide adequate water temperatures for salmonid life history needs

Example of Salmon Habitat Changes





The red areas in the figures above and above right highlight suitable fry rearing habitat. The pre-TRD channel (above) provided habitat over the wide range of flows expected during the winter months when fry are emerging from spawning beds. However, the riparian berm of the post-TRD channel (above right) confines the river, eliminates the gently sloping channel margins, and increases water velocities along the channel margins beyond that preferred by salmon and steelhead fry. The gentle slope of the natural gravel/cobble bars slows the water velocity along the edge of the river, creating rearing habitat for salmon and steelhead fry. Emerging fry hide among the clean cobbles and gravel where water velocity is low. As flows increase, the habitat migrates progressively higher up the channel margins, but never disappears. Yellow-legged frogs also use the gently sloping gravel and cobble bars to deposit eggs.

How much have the Trinity River fish stocks declined?

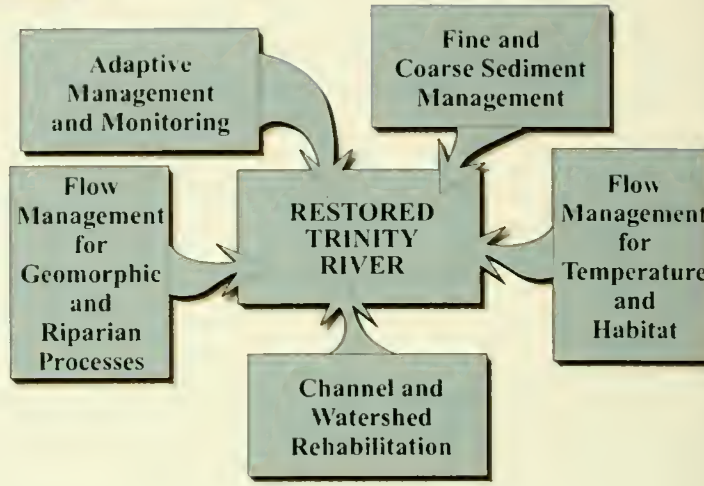
Estimates of fish abundance prior to the dams were sporadic and imperfect. The best available estimates suggest that the number of fall-run chinook salmon returning to the river each year varied between 19,000 to 75,500. Post-TRD, the average returns were approximately 20% of those estimates. The Trinity Restoration Program has adopted a goal of 62,000 natural (non-hatchery) fall-run chinook salmon to maintain a healthy, sustainable population. Spring-run chinook salmon, coho salmon and steelhead have shown similar declines. Coho salmon is also listed as a threatened species pursuant to the Endangered Species Act.

Record of Decision

Signed in December 2000, the Record of Decision (ROD) outlines the plan to implement recovery of the Trinity River and its fish and wildlife populations. This plan includes direct in-channel actions, as well as continued watershed restoration activities, replacement of bridges and structures within the floodplain, and a rigorous program to monitor and improve restoration activities.

Restoring the Trinity River will require a combination of actions that
1) re-establishes the natural physical processes that creates and maintains high quality aquatic habitat; and
2) creates spawning and rearing conditions downstream of the dams that best compensate for lost habitat upstream, including adequate water temperatures.

This strategy does not strive to recreate pre-dam conditions; rather, the goal is to create a smaller, dynamic alluvial channel exhibiting all the characteristics of the pre-dam river but at a smaller scale. This strategy is intended to best achieve the restoration goals and maintain the purpose and use of the TRD.

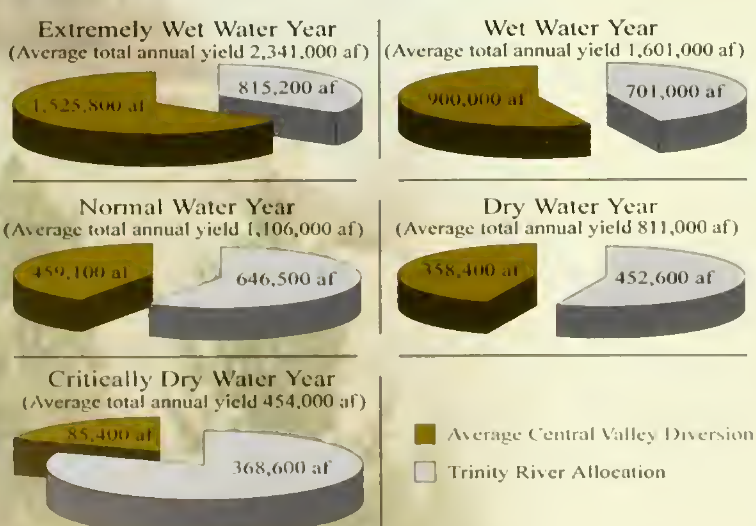


Primary components of the Trinity River Restoration Program Record of Decision

Permanent Flow Allocation

The best scientific information available recommends more natural and variable flow releases. Variable flows of sufficient size clean spawning gravels, build gravel/cobble bars, scour sand out of pools, provide adequate temperature and habitat conditions for fish and wildlife at different life stages, control riparian vegetation, and perform many other ecological functions.

In order to recreate inter-annual, or "between-year" flow variability, the Record of Decision defined five water year types with a minimum volume of water to be released into the Trinity River for each of the five types. The water volumes are measured in acre-feet (af), which is the volume of water one foot deep in the area of one acre. Each year, the water not allocated to the river is available for export to the Central Valley for water supply and power generation.



Intra-annual, or "within-year" flow variability is incorporated into "hydrograph components" that meet specific restoration objectives. The hydrographs at the far right show the flow releases for every day of each water year (October 1st through September 31st) for each water year type. The objectives these hydrograph components are designed to achieve are outlined in the legend at right. Flow releases will range from 300 cfs to 11,000 cfs (with annual peaks from 1,500 in Critically Dry years to 11,000 cfs in Extremely Wet years).

FLOW SCHEDULE LEGEND

For comparison: Representative hydrographs for the Trinity River at Lewiston for each water year class showing flows without dams.

Temperature: Provide optimal holding/spawning temperatures for spring-run chinook adults. Provide suitable temperatures, reducing pre-spawning mortality and increasing egg viability.

Instream Habitat: Provide best balance of spawning and rearing habitats for salmon and steelhead in the existing channel. Increase salmon and steelhead spawning and rearing habitat while minimizing dewatering of redds.

Temperature: Provide optimal temperatures for high survival of steelhead smolts.

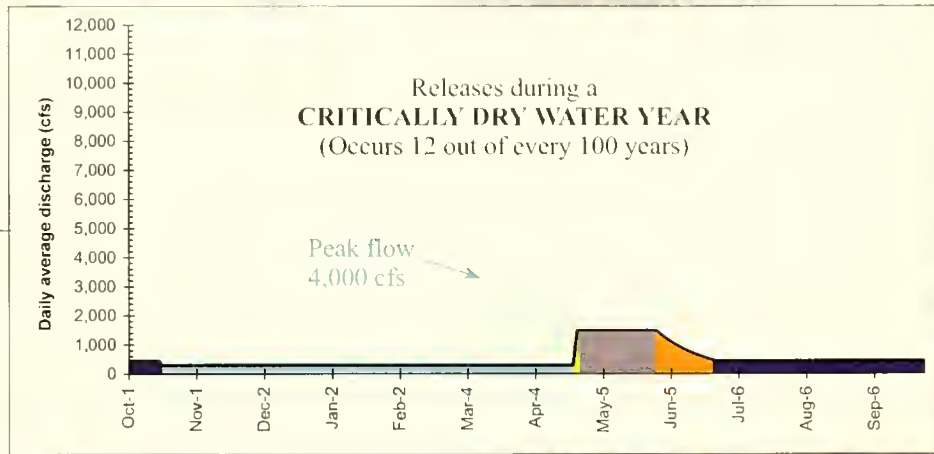
Ramping: Ramp to peak flow and reduce travel time of outmigrating steelhead smolts.

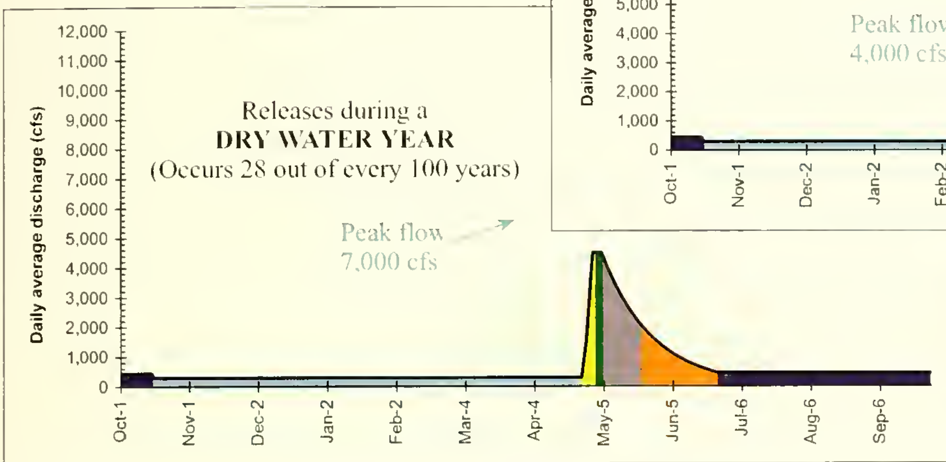
Geomorphology, riparian vegetation and smolt out-migration: In Normal and wetter years, create and maintain alternate bar morphology, create floodplains by bar building and fine sediment deposition, encourage riparian vegetation on floodplains, scour bars and riparian seedlings along low flow channel margins. In Dry and wetter years, reduce fine sediment storage, increase smolt production by increasing year-round rearing habitat quality and quantity, and reducing outmigration transport time.

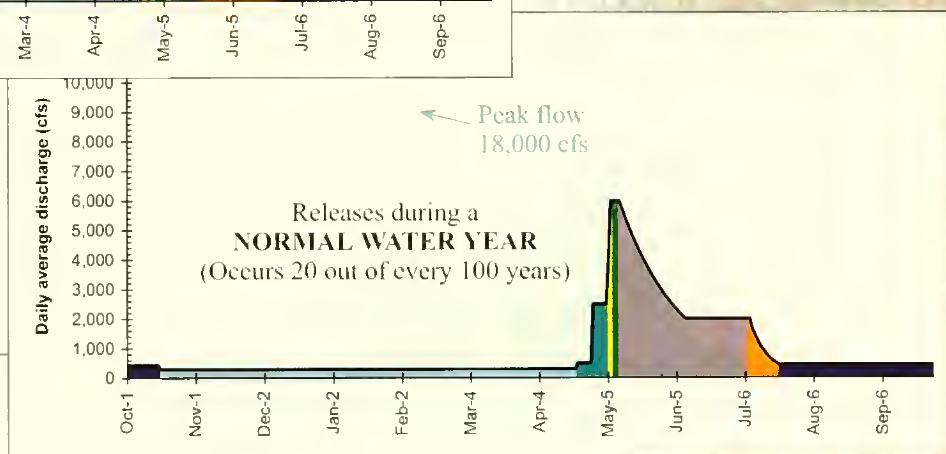
Geomorphology, riparian vegetation, temperature and smolt out-migration: Discourage riparian initiation along channel margins. Reduce fine sediment storage in channelbed surface. Maintain seasonal variation of water surface levels in side channels and off-channel wetlands. Inundate point bars. Improve salmon and steelhead smolt production by providing temperatures necessary for survival of steelhead, coho, and chinook smolts. Provide outmigration cues for chinook salmon smolts.

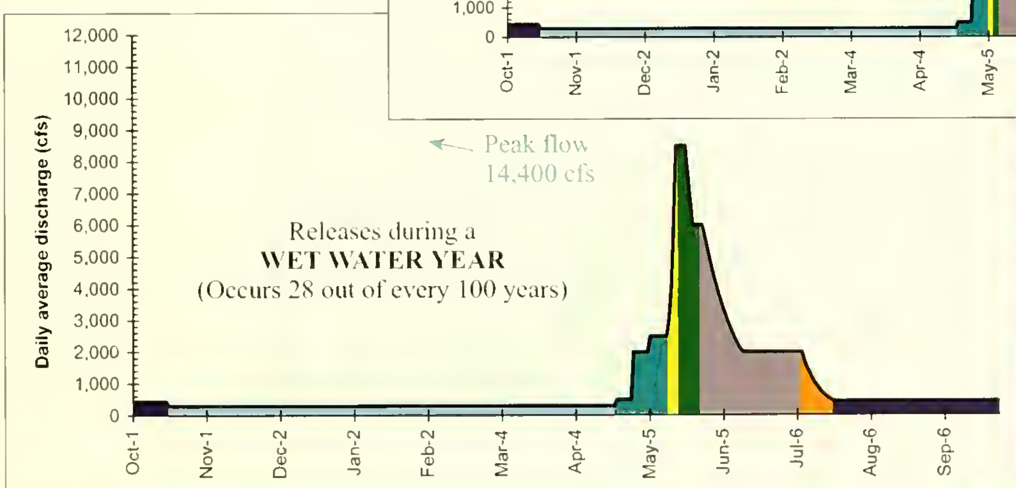
Ramping: Minimize stranding of salmon and steelhead fry behind berms, increase survival of steelhead fry, and provide outmigration cues for chinook smolts.

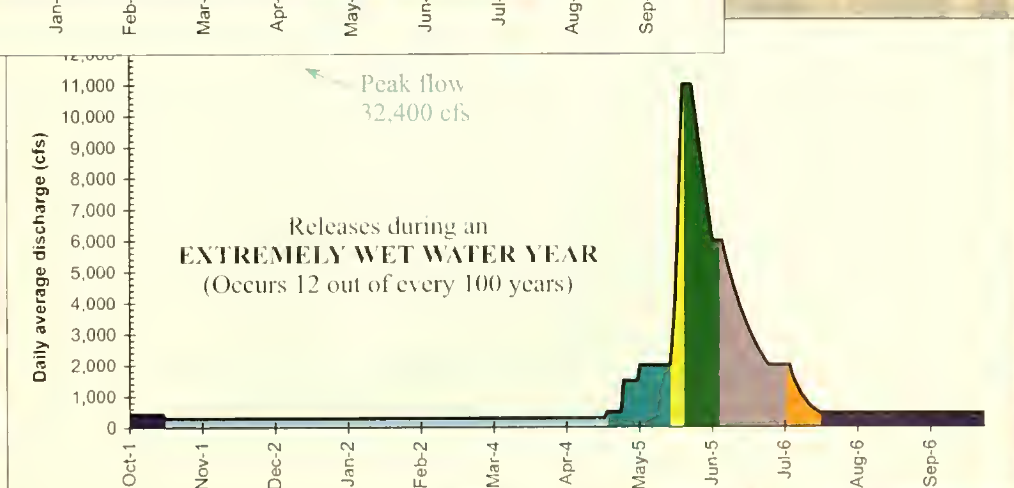
Flow Schedules











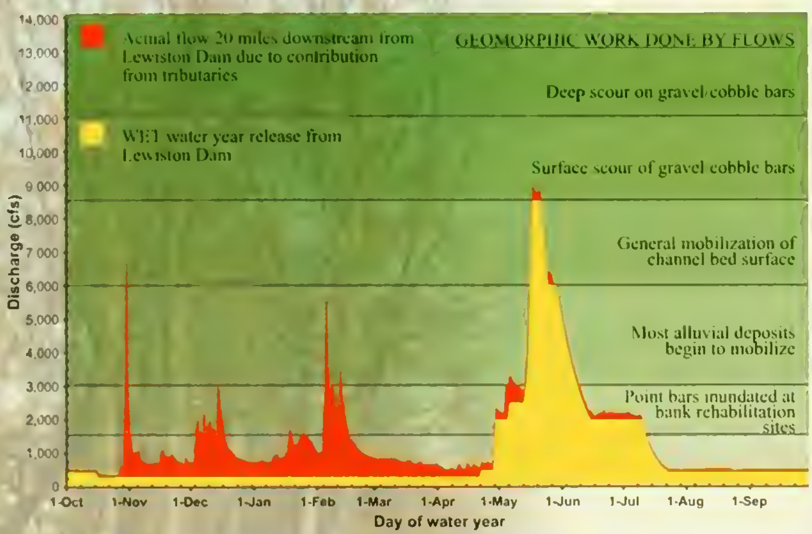
How would the flow schedule effect Central Valley water supplies?

Water exports from the Trinity River will be reduced on average by 28%. Water deliveries in the Central Valley Project will be reduced by 1-4% depending on whether it is a wet or dry year in the Central Valley.

Flow Management for Geomorphic and Riparian Processes

Tributaries and Managed Flows

The effects of the TRD would have been considerably more severe if not for the tributaries downstream of the dams. At increasing distances downstream from the dams, tributaries add their own water and sediment, and by the North Fork Trinity River (40 miles downstream from Lewiston Dam) the river regains much of its pre-TRD nature. Prior to the TRD, winter floods, generated by rainstorms and rain-on-snow events, were followed by spring snowmelt floods. These two different types of floods come from geographically distinct areas: the tributaries flowing into the Trinity River below the dams are typically lower elevation rainfall-dominated streams, and those entering above the dams are typically higher elevation snowmelt-dominated streams. Since the downstream tributaries do not provide significant spring snowmelt runoff, this important component of the natural hydrograph has disappeared. The high flow releases contained in the ROD will be timed to restore the annual spring snowmelt flood component critical to migrating smolts, riparian vegetation and sediment transport. These releases will be naturally augmented by unregulated inflow from downstream tributaries to create more natural annual hydrograph (see below for Wet water year example).



An Alluvial River

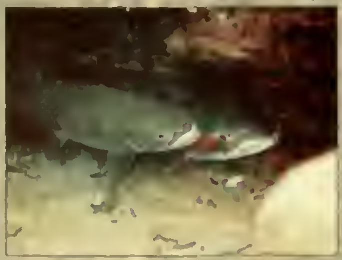
The Trinity River Restoration Program, recognizing the importance of a healthy alluvial river to salmon and steelhead recovery, developed the following set of healthy river attributes as a foundation for ecosystem restoration objectives:

- Channel complexity creates habitat complexity;
- Variable annual hydrographs create a complex channel morphology;
- The channel bed surface is frequently mobilized;
- Alternating bars are periodically scoured and/or redeposited;
- Fine and coarse sediment supply from the watershed is balanced by river transport;
- The mainstem channel periodically migrates or avulses across its floodplain;
- Floodplains are created, are frequently inundated, and are fine sediment deposition areas;
- Infrequent, large floods reorganize the mainstem channel, floodplain, and/or side channels, as well as to scour mature riparian vegetation;
- Riparian vegetation is spatially and structurally diverse and self-sustaining;
- Groundwater in the floodplain is frequently recharged by high flows in the mainstem channel.

These alluvial attributes contribute to the quantifiable objectives for prescribing annual flow releases (shown on the previous page).

Flows for Instream Habitat

The quantity and quality of spawning and rearing habitat for salmon and steelhead varies with flow levels. In general, lower flows result in shallower water depths, lower velocities, and higher water temperatures, whereas higher flows have the opposite effect. This relationship between streamflow and habitat, developed during years of field study, was used to determine the preferred flow releases for riverine life stages of chinook salmon, coho salmon, and steelhead. Habitat is maximized at 150 cfs for some life stages and at higher flows for others. Within the existing channel, 300 cfs provides the best balance for juvenile rearing and adult spawning habitat. As channel morphology is restored, these flow-to-habitat relationships may change.

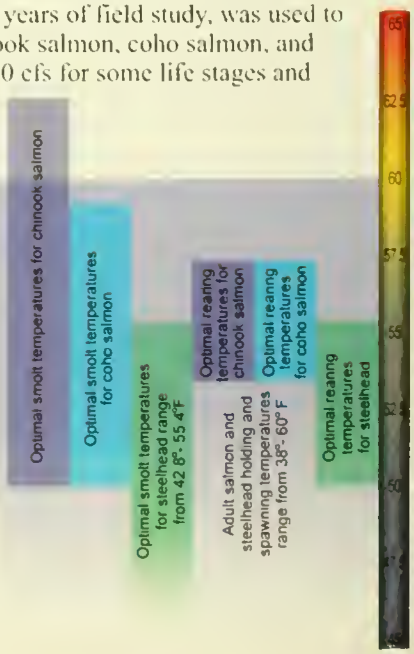


Holding steelhead

Rearing coho salmon fry

Flows for Water Temperature

Water temperature affects salmon and steelhead egg incubation, juvenile growth rates, timing of migration and spawning, resistance to disease, and other factors. Many temperature objectives can be achieved by seasonal climatic conditions or by flow releases required to meet other objectives (for example, transporting gravel). Flow releases during spring and summer were specifically developed to meet chinook salmon smolt outmigration objectives (1,500 cfs from mid-April through as late as early July) and adult holding and spawning temperature objectives (at least 450 cfs through mid-October).

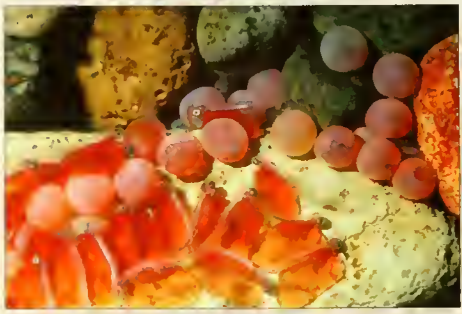


Coarse and Fine Sediment Management

Air photo of Rush Creek Delta showing local sediment accumulation and upstream backwater "lake"

Sediment Management

The sediment that makes up the bed and banks of the Trinity River ranges in size from silt and sand to gravel, cobbles and boulders. Since 1964, the dams have trapped all sediment that was normally delivered to the lower river from the upper watershed. Additionally, infrequent high flows of the past few decades have allowed sediment supplied from the tributaries in the first 17 miles below the dams to accumulate in deltas rather than be transported and distributed downstream as historically occurred prior to the TRD. Overall, the changes in the coarse sediment regime have reduced the natural gravel transport processes, reduced gravel bar deposits, and reduced salmon spawning and rearing habitat.



Chinook salmon alevin and eggs in clean spawning gravel

Coarse Sediment

The overall restoration strategy for managing coarse sediment is to increase coarse sediment storage in the river (gravel cobble bars), improve coarse sediment transport (distribute gravel/cobble downstream), and restore a balance between coarse sediment supply and coarse sediment transport using high flows and mechanical gravel introduction. If the river were considered a conveyor belt periodically transporting and depositing coarse sediment, the proposed restoration strategy would add coarse sediment at the upstream end of the conveyor belt at a rate equal to what the conveyor is moving, such that accumulations (at tributary deltas, see photo above left) or deficits (channel incision and armoring) are minimized. This strategy can be referred to as restoring the coarse sediment budget.

Specific recommendations consist of the following:

- Release flows up to 11,000 cfs to transport and distribute cobbles and gravels from tributary deltas to create bars, riffles, and floodplains in downstream reaches;
- Replenish cobble and gravel storage in the reach immediately downstream of Lewiston Dam that is most impacted by the loss of upstream coarse sediment supply;
- Introduce long-term periodic gravel and cobble supply in first fifteen miles below Lewiston Dam at a rate equal to that transported by high flow releases to maintain cobble and gravel storage, enabling the river to create and maintain complex instream habitat.

Coarse Sediment Introduction

Recommended flow releases will be larger in wetter water years than drier water years. Therefore, larger volumes of cobble and gravel will need to be introduced immediately downstream of Lewiston Dam during wetter years. Based on preliminary sediment transport computations, the following estimates of gravel and cobble introduction needs for each water year are as follows:

Water Year Type	Annual Introduction Volume
Extremely Wet	31,000-67,000 cubic yards
Wet	10,000-18,000 cubic yards
Normal	1,800-2,200 cubic yards
Dry	150-250 cubic yards
Critically Dry	0 cubic yards

Actual introduction rates for a given year would be based on sediment transport estimates specific for the high flow releases for that year.

What does watershed land use have to do with salmon and steelhead?

Fine sediment (sand and silt) delivery from tributary watersheds to the Trinity River increases with roads, logging, and other land uses. These fine sediments accumulate in the Trinity River, and pose a severe threat to the survival and development of salmon and steelhead eggs. By improving land use practices and removing unused logging roads (as shown in the photo at right of a recontoured logging road in the Little Grass Valley Creek watershed), fine sediment supply to the Trinity River decreases, which increases salmon and steelhead production.

Fine Sediment

Land use in the watershed and reduced flows in the river have allowed fine sediment to accumulate in pools, riffles and riparian berms. This accumulation has decreased adult salmon holding habitat in pools and spawning and rearing habitat quality in riffles, and the riparian berm now confines the river during high flows. The proposed restoration strategy for fine sediment management is to reduce fine sediment supply and storage in the Trinity River.

Proposed restoration actions include the following:

- Continue watershed rehabilitation work to reduce fine sediment supply to Trinity River;
- Continue using sedimentation ponds at the mouth of Grass Valley Creek, and improve the maintenance schedule to reduce fine sediment supply to the Trinity River;
- Increase high flow releases to transport fine sediment through the Trinity River;
- Remove sand-laden riparian berms as part of bank rehabilitation sites, and relocate the fine sediment outside the floodway;
- Create "functional" floodplains as part of bank rehabilitation projects such that high flows can scour fine sediment from the low flow channel and deposit it onto floodplain surfaces.

Channel Rehabilitation

Restoring the Trinity River to a healthy alluvial river to benefit salmon and steelhead populations will require converting the present riparian berm-dominated channel back to the pre-TRD channel form, but at a smaller scale. Studies conducted in 1995 and 1998 found that flood flows greatly exceeding 24,000 cfs would be needed to "naturally" remove the berm. However, since Trinity Dam is only capable of a maximum controlled release of 13,750 cfs, a one-time mechanical removal of selected berms between Lewiston Dam and the North Fork Trinity River is needed to "unshackle" the river and restore the channel.

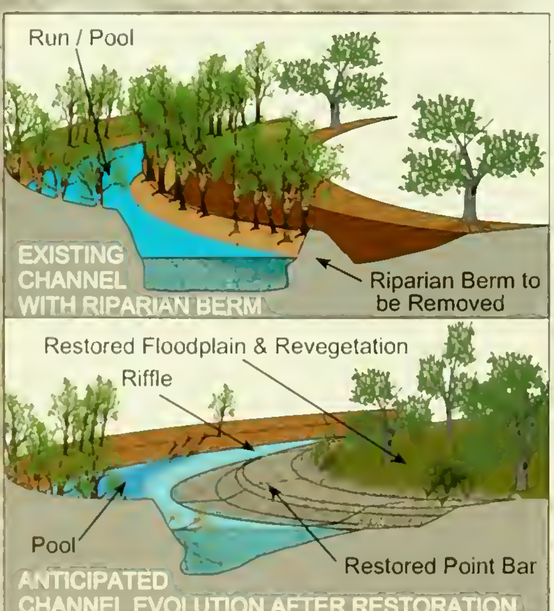
Flow and sediment management will be used after the one-time mechanical removal of the berms to create and maintain high-quality aquatic and riparian habitat. Observations at rehabilitation sites constructed between 1991 and 1993 have shown that once the riparian berm is removed and new bars have formed, flow and coarse sediment management directed by the Record of Decision is capable of maintaining the desirable channel morphology.

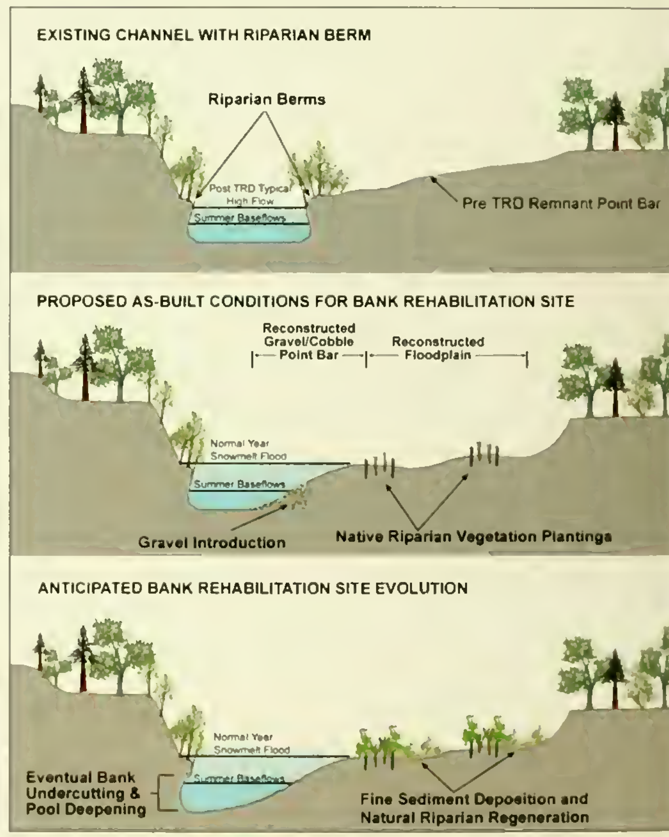
Sheridan Creek Bank rehabilitation site with newly formed gravel bars

Bank Rehabilitation

Riparian berms that confine the river will be removed, and sand contained in the berm relocated outside of the floodway. Floodplains will be constructed to be periodically inundated by flows 6,000 cfs and larger. At sites closer to Lewiston Dam with limited gravel supply, coarse sediment will be introduced as gravel/cobble point bars to increase gravel storage, improve channel dynamics, and increase salmon spawning and rearing habitat.

Riparian vegetation will be planted on restored floodplains, and high flow releases have been developed to encourage natural riparian growth on floodplains while discouraging riparian encroachment on newly formed gravel bars. A strategy using a combination of native riparian planting and natural regeneration can quickly revegetate a floodplain rehabilitation project (see photo below left).





Natural regeneration (foreground) and riparian planting (background) one year after floodplain construction on Clear Creek, showing expected conditions on Trinity River rehabilitation sites shortly after construction.

Side Channel Rehabilitation

Side channels will also be constructed at selected sites close to Lewiston Dam that have a high likelihood of maintaining themselves. Side channels provide additional salmon and steelhead spawning and rearing habitat to make up for that lost above the dams.

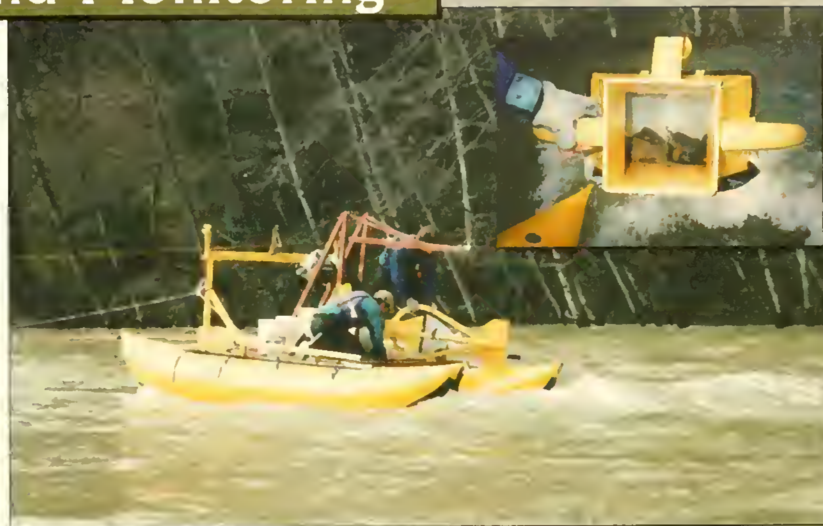
Side channel rehabilitation site

Adaptive Management and Monitoring

Adaptive Management

A key component of the Record of Decision is implementing an Adaptive Environmental Assessment and Management (AEAM) program, commonly referred to as Adaptive Management. The Trinity River AEAM program will greatly improve assessment and management of the Trinity River. In short, AEAM is a formal, systematic, and rigorous program of learning from the outcomes of management actions, accommodating change, and rapidly improving management.

River systems are very complex, and while our level of understanding of river ecosystems is improving, managing the Trinity River will always face varying levels of scientific uncertainty. The AEAM program promotes responsible, science-based progress in the face of this uncertainty, while avoiding "trial and error," "charging ahead blindly," or being "paralyzed by indecision" common to restoration programs. The AEAM process is a cooperative integration of water operations, resource management, scientific monitoring and research, and stakeholder and public input.



Sediment sampling during high flows measure the effectiveness of dam releases in routing gravel and sand through the river

A goal of the Restoration Program is to improve fish health and survival

What are the Components of an Adaptive Environmental Assessment and Management (AEAM) Program?

1. Define measurable goals and objectives;
2. Document/evaluate baseline conditions with respect to goals and objectives;
3. Develop testable hypotheses of how to achieve goals and objectives through management actions;
4. Predict river response to management actions before implementing management actions;
5. Implement, monitor, and evaluate management actions;
6. Re-evaluate objectives, refines hypotheses, improve models, and improve management;
7. Continually self-examine AEAM science and management via external peer review.

Improving management actions to better achieve restoration goals requires field monitoring

Monitoring

Monitoring is a critical component of adaptive management which measures progress towards achieving restoration objectives, as well as improving our understanding of river response to management actions (e.g., flow releases, gravel introduction, etc.).

The monitoring strategy under AEAM program will encourage two types of monitoring: long term tracking of how the system is responding (e.g., monitoring adult salmon returns), and shorter term focused studies (e.g., testing juvenile salmon tolerances to water temperature) to rapidly evaluate and improve management strategies and fill in critical information gaps.

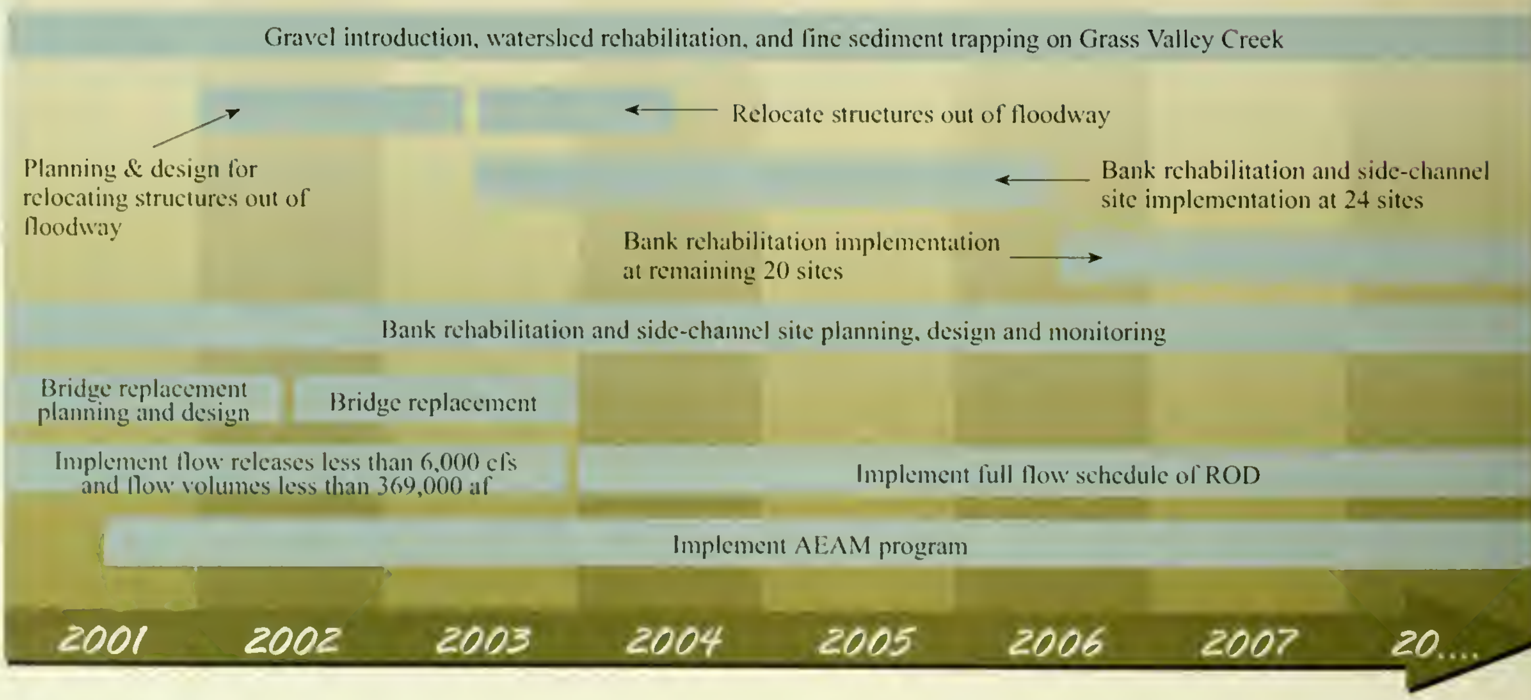
Monitoring will be guided by the scientific arm of the AEAM program, and much of the monitoring program will be conducted by soliciting proposals addressing specific issues from public, private, and academic scientists. This process will improve the quality of studies conducted on the river, and should also reduce overall costs over the long term.

Collateral Impacts and Benefits

The Trinity River Restoration Program is legally mandated to restore the fishery of the Trinity River. Beneficiaries of a restored fishery and restoration program include: the sport, tribal, and commercial fishing communities that depend on a healthy fishery; local contractors hired to implement the channel rehabilitation and gravel introduction projects; and the tourist and recreation industries along the Trinity River.

Unfortunately, a restoration program usually does not come without some adverse impacts as well. The Trinity River Restoration Program may cause periodic decreases in power generation, increases in consumer power rates, and decreases in water supply to the Sacramento and San Joaquin valleys. The Record of Decision attempts to restore a reasonable balance by developing an approach that has a high likelihood of achieving the legally mandated restoration objectives while minimizing adverse impacts to water and power users.

Implementation Timeline



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